operations of nature, and took great interest in philosophical pursuits generally; hence soon after settling in Manchester he sought admission into the Literary and Philosophical Society; his election, on January 25, 1842, taking place by a singular chance on the same day with Dr. Joule's and Dr. Schunck's, subsequently sharers with him in the honours of the presidency. In this Society, so congenial to his tastes, he was a leading spirit. It was mainly owing to his energy that the Society was maintained in its position as a publishing institution, and to it many of his more important papers were addressed.

One of the earliest of these was in 1843, when he read a paper entitled "An Account of the Petroleum found in Downholland Moss," showing that petroleum could be produced from the decomposition, or rather distillation of peat at a low temperature. Little was before known of the origin or utility of this product. In the inquiry he was associated with Mr. W. H. Talbot, who assisted him in making the bores and obtaining information respecting the moss. The following is extracted from Mr. Binney's statement to the Philosophical Society (*Proceedings* of the Society, vol. viii. p. 136). "On the 26th November, 1848, I went to Downholland and showed the deposit to Mr. James Young, and explained to him how the petroleum was there formed. This was before I accompanied that gentleman to Riddings, at Easter, 1849, and went down Mr. Oakes's pit, where the deep coal was wrought, and petroleum flowed from the roof. At both those places the supply of petroleum was not sufficient for commercial purposes on an extensive scale. The Bathgate works were the cause of the petroleum trade in America. In Scotland paraffin oil was first made on a large scale and introduced as an article of commerce. In the suit of Young *v.* White and others, tried at Westminster in 1854, the circumstances under which Mr. Young first became acquainted with the petroleum at Riddings were given to the public. Of course when the Americans saw the report of that trial they ceased to import high-priced Boghead coal from Scotland, upon which they had to pay a patent right for the manufacture of paraffin oil, and immediately resorted to petroleum, which had been running to waste for ages."

The name "paraffin," adopted by Mr. Binney, was a principal means by which the patent was established.

The successful commercial enterprise thus commenced did not alienate Mr. Binney from the pursuit of science. Besides his paper "On the Origin of Coal," December 1, 1846, he made elaborate investigations on Permian and Triassic Strata; on building stones, of which he made the collection in the geological museum which he was mainly concerned in establishing, and filling with specimens of his own collecting; the drift deposits of Manchester and its neighbourhood," &c., &c. From the last-named paper I extract a paragraph indicating his love of the subject:—"The examination of the older fossiliferous rocks, rich with the remains of organic life, has generally attracted the attention of geologists, to the exclusion of the drift, which has been but too often considered as a dry and uninteresting study. My intention is to attempt to dispel this delusion. However delightful it may be to the human mind to examine the 'medals of creation,' as Cuvier aptly denominated fossil organic remains, and to trace back through countless ages the successive races of beings that have formerly peopled this globe—performed the parts for which they were designed, and then ceased to exist; to investigate the various forms of vegetable life that deprived the atmosphere of its surplus carbon, for the double purpose of forming our invaluable beds of coal, and at the same time fitting the air for the respiration of animals of a higher order; and to examine the wonderful chemical agencies that have been in operation in the great laboratory of nature, in order to prepare our metallic and mineral treasures; still, the last great physical causes which have operated on the face of the globe, and adapted it for the habitation of man, deserve our attention in an equal, if not more pre-eminent degree.

"It is to this last and finishing stroke of the Creator that the earth chiefly owes its present arrangement of land and water, its beautiful variety of hill and dale, and its different kinds of soils for the support and nourishment of the vegetable kingdom—that wondrous agent for the conversion of brute into organic matter, which fits it for food for the use of the animal creation, and man himself." ("Manchester Memoirs," vol. viii. N. Ser. p. 196).

Mr. Binney had great sympathy with all earnest intellectual labourers, particularly with those of straitened means, and it did not matter much with him in what field their energies were displayed. Thus among those he helped with his counsel and assistance, Sturgeon, to whom we owe so many first steps in theoretical and practical electricity, is a striking example. It was through Mr. Binney's exertions that this singularly gifted man was rescued from poverty and received Government recognition of his discoveries. Then there were Butterworth the geometrician, Bamford the poet, Richard Buxton the botanist, and many others, whom he cared for with almost a paternal solicitude.

Sixteen years ago he purchased Ravenscliff, in the Isle of Man, and there he spent a large portion of his time, showing much hospitality to men of kindred tastes to his own. There he took pleasure in botany and such geological investigation as the island afforded. He desired nothing more ardently than that nature should flourish around him, and his place was fragrant with myrtles, escalloniæ, and roses. He took much interest in a *Eucalyptus globulus*, which, planted close to the sea, grew to the height of twenty feet in a few years.

I do not recollect any one whose heart seemed as it were to go out to all living things with the warmth of affection shown by him. I cannot in this regard help recalling a circumstance which occurred in a walk with him on Langness. A bird's nest containing two eggs being found on the ground, he flung himself down beside it and contemplated it with the greatest delight, but without touching or disturbing it in the least.

He was an enemy to all the so-called "sports" in which cruelty to animals and gambling are the principal features, such as pigeon-shooting, horse-racing, &c. To one who asked him to subscribe 5*l.* for the establishment of a race-course his characteristic reply was: "I will gladly subscribe 5*l.* to prevent it." He even possessed a kind of sympathy, known only to poetic minds, for vegetable life, fully concurring with a remark I made to him, that a man who could take pleasure in felling a noble tree must be destitute of the finer feelings of humanity.

Mr. Binney had a large, muscular frame, and his countenance in profile resembled that of Cato the censor, with whose character he had many points of strong resemblance.

Long time a sufferer in health without fatiguing his friends with complaints, "the silver cord was loosed" on December 8. The paralysis terminated fatally on the 19th, and on the 23rd he was buried in the family grave at Worksop.

He has left a widow, daughter of the Rev. David Jones, Rector of Hope Bagot, near Ludlow, and six children.

J. P. JOULE

THE LATE CHANGES IN THE VESUVIAN CONE

NOVEMBER, 1881.—The condition of the crater of Vesuvius is at present exceedingly interesting. This is especially so after the continuous active state that the mountain has been in for nearly three years. The old crater of 1872 is now completely filled, and has in fact been so for some time. About three-quarters of the edge

has been overflown by lava at various times, but especially by the eruptions of the last two years. Last June, arising from the plain or platform of lava formed by the filling of the crater, was the cone of eruption. This was situated east-north-east of the axis of the mountain. It formed a small steep-sided cone till the eruption of July destroyed the northern portion, forming a large low crater. Its condition on November 5, when I visited the crater or craters, was most instructive, and reminds one of a figure and description given by Sir W. Hamilton in his "Campi Phlegrei."

Arriving at the edge of the 1872 crater from the west one crosses the crater plain, and arrives at a low semi-circular ridge with an average height of about twenty feet. Ascending this rim-like heap of scoria, one observes occupying its irregular bottom fumaroles and yellow patches of decomposing lava. The complete crater of July is formed of this ridge, together with the southern portion of the former cone of eruption. Within this space rose another cone of eruption whose centre was occupied by the main vent. On this occasion it was possible to approach within a few yards of the great mouth, from which issued the column of vapour and momentary puffs of fluid lava fragments. Thus it will be seen that there are at present three cones and craters one within the other.

This, however, was not the most interesting point. In the lava of the great plain we discovered a large cone or lava tunnel about eight feet high, twenty or thirty feet long, and fifteen feet broad, but with a general slope downwards. The roof was composed of lava about eight months old, but much decomposed. The whole cave presented one glistening forest of stalactites, some three hundred about were counted; also stalagmites. Most of these were from two to three feet long, and a few twice that length; many, however, with a uniform diameter of less than an inch throughout and tubular, divided by septa, reminding one of an Orthoceras in structure. The colours most various and beautiful: bird's-egg blue, acqua marine, salmon white, yellow, and reddish brown, and many variegated in these colours. The effect after the eyes quitting the rugged and fierce scenes around seemed to rest on some fairy cave.

On attempting to approach the entrance the gust of hot air, redundant with hydrochloric acid vapour, almost prevented one from making an attempt at an entrance. However, these beautiful and interesting prizes determined me to make an endeavour. Nose and mouth muffled, and having placed my friends on each side of the entrance with a strap, I made a dive down some steps. The effect was at first almost suffocation, stinging of the conjunctiva, and a profuse perspiration. To grab a few of those stalactites near at hand and return was the work of a minute, then the hearty pull-up by my friends, a fit of coughing and a little fresh air restored me. This was repeated eight times, during which I was able to obtain all the best specimens, some thirty examples, and reach the extremity of the cavity. These prizes were carried carefully to Naples, where they have been placed under glass in a dry atmosphere, since they were highly deliquescent. A qualitative analysis gives the chief component as chloride of sodium, with chlorides of potassium, iron, manganese; sulphates of soda, potash, iron, and copper.

They were undoubtedly formed in the following manner:—The heavy rains we have had here lately dissolved out the materials from the decomposing lava above. The solution as it descended was evaporated by the current of hot air continually circulating through the cave, thus driving off the water and depositing the salt. Many showed within their cavities crystals of Halite Sylvine, and a few also Molysite.

December.—In the early part of this month lava commenced to flow down the eastern or Pompei side; this, although not seen from Naples, gave a brilliant reflection at night which could be observed from the city. This aurora continued with variable intensity until December 25, 1881, when it reached its climax. The lava had commenced to issue by a fissure nearly north of the base of the cone of eruption. During the three weeks that it flowed this fissure had become widened and opened up. On Christmas and the following day the quantity of lava increased much in quantity, and altogether Vesuvius was much more active. The rent at this time had extended down the slope about one-third the distance of the Vesuvian cone and formed at its upper or wider part, an opening of about 120 feet in breadth by the same in depth. The floor which I visited and walked up on December 29 was covered by the scoria and lava blocks continually falling from its edges. This floor sloped downwards to the end of the fissure at a small inclination. From its termination issued the larva already spoken of.

This was a good example of the opening up of a dyke to the surface of a volcanic cone, so lucidly described by Mallet ("Mechanism of Production of Volcanic Dykes, and on those of Mount Somma," *Quart. Journ. Geol. Soc.* vol. xxxii. p. 472).

The lava that issued at first descended the cone, crossed the Valle dell' Inferno, following the course of the 1834 stream, and threatening Otajano. It stopped, however, and followed a course across the Atrio in a north-east direction, where it can do no harm.

An important fact was brought out by this eruption, small as it was. When the level of the lava in the vent had been lowered by exclusion of the fissure downwards an entire change of ejectamenta took place. The soft masses of pasty lava as ejected generally was replaced by rounded fragments of solid and old lava and volcanic ashes. The cone of eruption having no longer the column of lava to support it internally had crumbled in and was being ejected piecemeal by the explosions in the form of stones and ash. This we had practical experience of. At one time approaching somewhat incautiously through the mist we were practically warned to beat a hasty retreat by hearing the rattle around us of small, and the heavy thud of larger stones. The beautiful yellow crater plane of 1872 had been covered by the dull grey ash, only relieved by numerous green-coloured saline crusts rich in copper. This was made evident on looking at our boot-soles, where we found the nails thickly plated with metallic copper.

Near the end of the above-mentioned fissure the lavas were flowing down the mountain in a tunnel. The roof had broken through at one place, and standing a few yards above this a fine sight presented itself. Figure a long fairly regular arched passage of about a metre and a half wide by the same in depth, along which one could see for one or two hundred yards.

This was bright red-hot, and flowing along its floor with considerable rapidity was a stream of bright orange-coloured lava with the liquidity almost of water. In this we were able to carry on some experiments on the specific gravity of molten and cold lava, which reverse the results obtained on former occasions by Palmieri and others, and which will prove that cold is of higher specific gravity than molten rock, as theoretically should be the case. These facts, however, will be described elsewhere.

H. J. JOHNSTON-LAVIS

ILLUSTRATIONS OF NEW OR RARE ANIMALS IN THE ZOOLOGICAL SOCIETY'S LIVING COLLECTION[1]

V.

11. THE Beatrix Antelope (*Oryx Beatrix*).—The antelopes of the genus Oryx constitute a well-defined and most beautiful group of the Bovine Family. Although not amongst the largest of the antelopes, they are animals of above the average size in the group. The males are

[1] Continued from vol. xxiv p. 534